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A NEW MARINE SPECIES OF *SMITHSONIDRILUS* (OLIGOCHAETA: TUBIFICIDAE) FROM THE FLORIDA KEYS

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Abstract.—*Smithsonidrilus exspectatus,* new species, is described from barely subtidal sediments at Pigeon Key (near Marathon) and Bahia Honda, southern Florida. It appears phylogenetically intermediate between *Smithsonidrilus hummelincki* and the most apomorphic group within the genus (*Smithsonidrilus marinus, Smithsonidrilus involutus, Smithsonidrilus westoni,* and *Smithsonidrilus multiglandularis*); all these species show a northwest Atlantic distribution. The new species has the same kind of spermatheca as, but a less elaborate copulatory sac (pseudopenis) than, those of the species in the *S. marinus* group. The dilated, heavily muscular ejaculatory duct appears to be an autapomorphy of *S. exspectatus.*

The marine tubificid genus *Smithsonidrilus* Brinkhurst, 1966, was revised by Erséus (1990), who presented an hypothesis of the phylogenetic relationships between all species of the genus, based on a parsimony analysis of morphological characters. According to the most parsimonious cladogram (Erséus 1990: fig. 31), a group of species form a highly apomorphic, monophyletic, group within *Smithsonidrilus,* defined by at least two synapomorphies, (1) the unpaired ejaculatory duct, and (2) the modification of the prostatic pads into atrial diverticula. These species, *Smithsonidrilus marinus* Brinkhurst, 1966, *Smithsonidrilus involutus* Erséus, 1990, *Smithsonidrilus westoni* Erséus, 1982, *Smithsonidrilus multiglandularis* Erséus, 1990, and *Smithsonidrilus hummelincki* (Righi & Kanner, 1979), are all northwest Atlantic (largely Caribbean) taxa.

During an ongoing study of the distribution of marine Tubificidae in southern Florida, by Milligan and Erséus, an additional member of this group was found. The species, *Smithsonidrilus exspectatus,* new species, is described in the present paper.

The material was collected by M. R. Milligan and C. Erséus at barely subtidal localities in the Florida Keys, southern Florida. The specimens were sorted live under a dissecting microscope from elutriated sediment samples, fixed in Bouin's fluid, and later stained with paracarmine and mounted whole in Canada balsam. The type material has been deposited in the United States National Museum of Natural History (USNM), Washington, D.C., and the Swedish Museum of Natural History (SMNH), Stockholm.

Smithsonidrilus exspectatus, new species
Fig. 1

Holotype.—USNM 160304, whole-mounted specimen.

Type locality.—Off small beach, NE corner of Pigeon Key (W of Marathon), Florida Keys, 0.1 m, coarse sand with gravel and pebbles (4 May 1990).

Paratypes.—USNM 160305, 160306, three specimens from type locality. SMNH Type coll. 4533, two specimens from close to rocks, W end of Bahia Honda (N side), beach in Bahia Honda State Recreation Area, Florida Keys, 0.5 m, medium to coarse

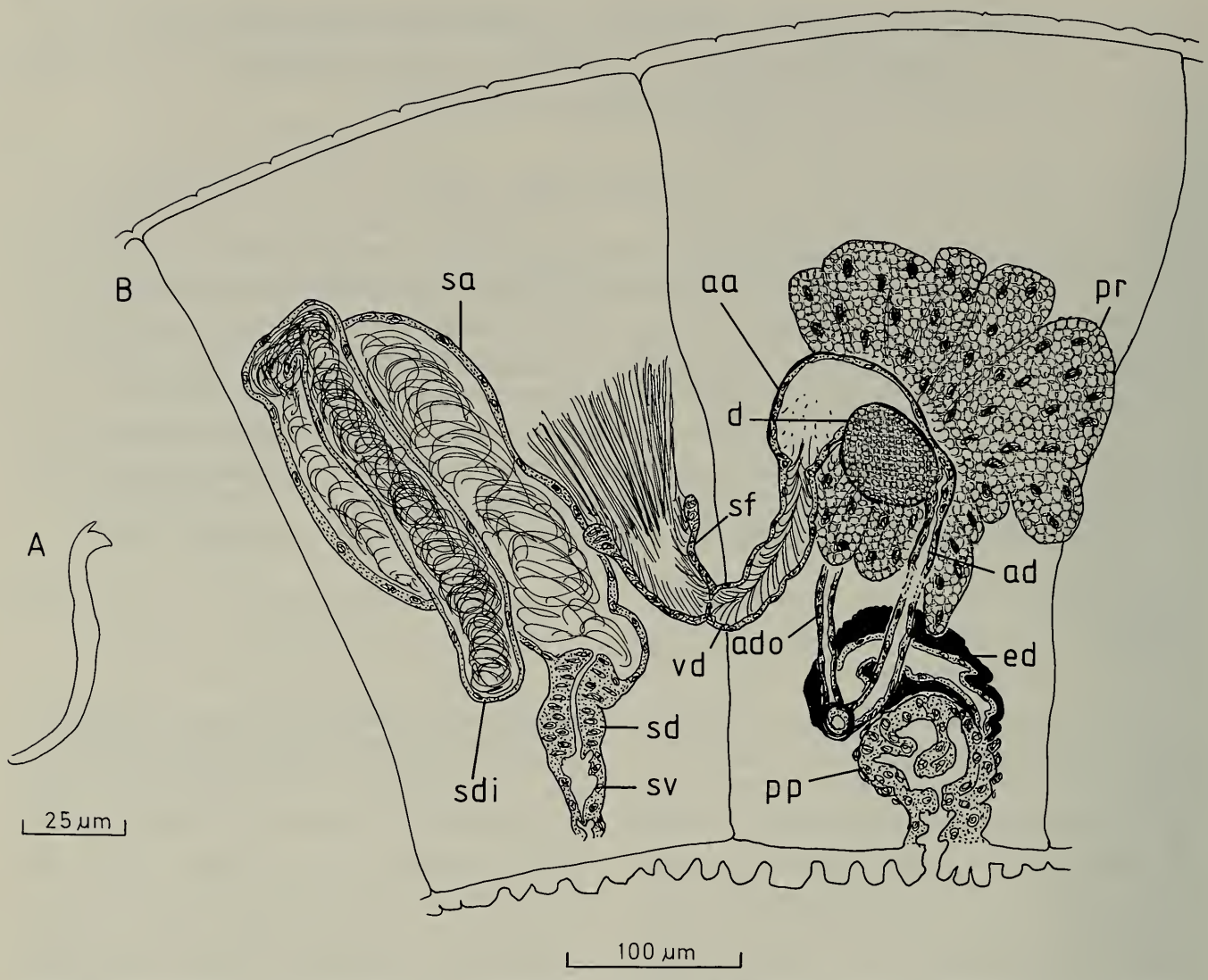

Fig. 1. *Smithsonidrilus exspectatus,* new species. A, Seta; B, Lateral view of spermatheca and male genitalia in segments X–XI. Abbreviations: aa, atrial ampulla; ad, atrial duct; ado, atrial duct of other side; d, diverticulum (modified prostatic pad); ed, ejaculatory duct; pr, prostate gland; pp, pseudopenis (copulatory sac); sa, spermathecal ampulla; sd, spermathecal duct; sdi, spermathecal diverticulum; sf, sperm funnel; sv, spermathecal vestibule; vd, vas deferens.

sand with cobbles and gravel (3 May 1990); SMNH Type coll. 4534, one specimen from at foot of dock, N side of Pigeon Key (W of Marathon), Florida Keys, 0.6 m, heterogeneous medium to coarse sand (4 May 1990).

Etymology.—Named *exspectatus* (Latin for 'expected') indicating that the species is morphologically intermediate between other known species of the genus (see Discussion below), as if it could have been predicted to exist.

Description.—Length (7 complete specimens) 10.4–16.5 mm, 54–87 segments. Width at XI 0.41–0.55 mm. Prostomium pointed or rounded triangular. Clitellum extending over about ⅔X–⅔XII. Setae (Fig. 1A) bifid, with upper tooth much thinner and shorter than lower. Setae 45–80 µm long, 3–5.5 µm thick at node, two or three (occasionally only one) per bundle anteriorly, totally absent from XI, two (occasionally only one) per bundle thereafter. Male pore unpaired, located mid-ventrally and posterior to middle of XI. Spermathecal pore unpaired, mid-ventral, near middle of X.

Pharyngeal glands in (III)IV–V. Oesopha-

geal diverticula, in IX, slender. Male genitalia (Fig. 1B) complex, paired for most parts; but ejaculatory duct and pseudopenis (copulatory sac) unpaired. Sperm funnel conspicuous and deep. Vas deferens thin-walled, ciliated, 25–35 μm wide, about as long as atrial ampulla, but not clearly set off from latter. Atrial ampulla about 100–175 μm long, entally dilated, 25–55 μm wide; cilia inside not observed (see Remarks). Ectal part of atrial ampulla narrow, but bearing oval, heavily granulated diverticulum (=modified prostatic pad), up to 50–60 μm long; however, diverticulum appearing poorly developed in some specimens. Large, lobed prostate gland attached to this diverticulum. Atrial ampulla ectally terminating in slender, non-granulated, atrial duct, 115–140 μm long, 13–19 μm wide. Atrial ducts of both sides joining each other while entering conspicuous, unpaired ejaculatory duct. Ejaculatory duct 100–165 μm long, 45–90 μm wide, with heavily muscular, often folded, walls; muscle layer maximally 5–15 μm thick. Ejaculatory duct entering subapical, posterior part of compact copulatory sac. This sac, acting as an eversible pseudopenis, 75–80 μm deep, 65–75 μm wide, with complex, folded walls [and in at least one paratype, bearing a small copulatory gland]. Spermatheca (Fig. 1B) unpaired, consisting of (1) an inconspicuous vestibule, (2) a short duct, about 60–90 μm long, 28–38 μm wide, (3) a large, thin-walled, generally somewhat oval, ampulla, about 200–280 μm long, 80–140 μm wide, and (4) a filiform diverticulum, about 260–390 μm long, 35–45 μm wide, attached to inner end of ampulla. Sperm in random mass throughout spermatheca; mass denser in diverticulum than in ampulla.

Remarks.—In the whole-mounted specimens, cilia could not be observed in the atrial ampullae; cilia occur there in all congeners. Possibly, the atrial ciliation is reduced in *S. exspectatus.*

Distribution and habitat.—Known only from the Florida Keys (Atlantic coast of southern Florida). Barely subtidal (known from 0.1–0.6 m depth), medium to coarse sand.

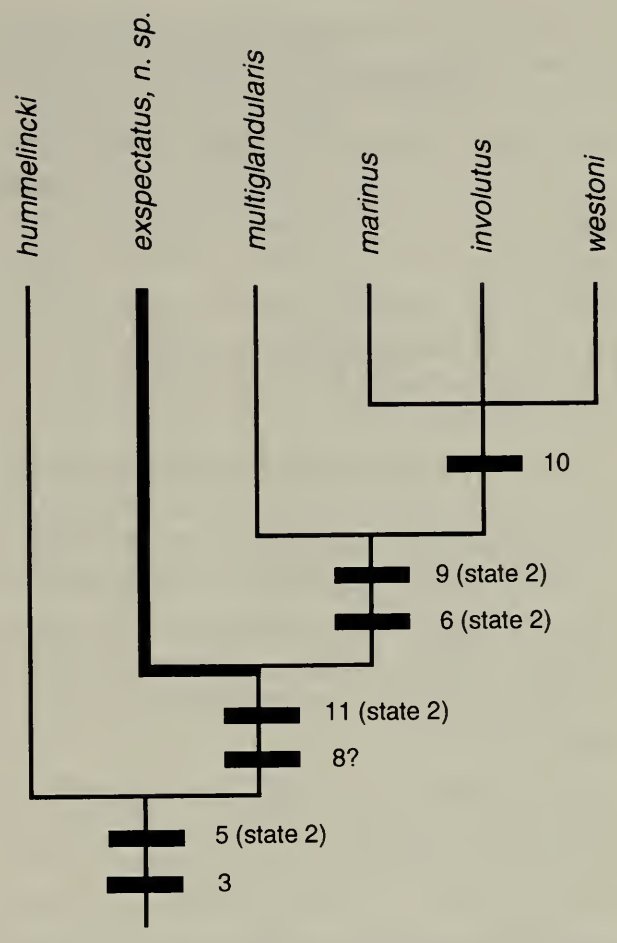

Fig. 2. *Smithsonidrilus exspectatus,* new species, inserted in the most parsimonious cladogram of the (most apomorphic) species of *Smithsonidrilus* (after Erséus 1990:fig. 31). Numbers of character and character states refer to table VI in Erséus (1990): character 3, prostatic pads modified into atrial diverticula; 5 (state 2), ectal part of atrial ducts modified into slender, unpaired ejaculatory duct; 6 (state 2), copulatory sac large, much folded; 8, copulatory glands present; 9 (state 2), spermathecal vestibule large, with folded walls; 10, spermathecal glands (associated with vestibule) present; 11 (state 2), spermathecal ampulla bipartite, bearing filiform diverticulum.

Discussion

Smithsonidrilus exspectatus is morphologically intermediate between *S. hummelincki* and the group consisting of *S. multiglandularis, S. marinus, S. involutus* and

S. westoni. Its copulatory (pseudopenial) sac is more bulbous and complex than the one of *S. hummelincki,* but not as elaborate as those of the others. The other species (but not *S. hummelincki*) all have copulatory glands (one or more) associated with their pseudopenes; in a single specimen of *S. exspectatus* a small copulatory gland, similar in size and shape to the one of *S. involutus* (see Erséus 1990:fig. 36E), was noted.

The spermatheca of *S. exspectatus* is similar to those of *S. marinus, S. involutus, S. westoni* and *S. multiglandularis,* particularly with regard to the filiform diverticulum (Fig. 1B, sdi), but its vestibule (sv) is not as developed as in the four other species. In *S. hummelincki,* the spermatheca lacks a diverticulum.

If *S. exspectatus* is inserted in an already published cladogram (Erséus 1990:fig. 31; see Fig. 2), it will intervene between *S. hummelincki* and *S. multiglandularis,* sharing with the latter state 2 of character 11 (spermathecal ampulla with filiform diverticulum), but not state 2 of characters 6 (copulatory sac large, much folded) and 9 (spermathecal vestibule large, with folded walls) (numbers referring to Erséus 1990: table VI). As indicated above, it may also share character 8 (copulatory gland) with the most apomorphic species of *Smithsonidrilus.*

The paired parts of the atrial ducts of *S. exspectatus* are narrow and not granulated, and thus they resemble those of *S. hummelincki* more than those of most other congeners. Whether this resemblance is synapomorphic or convergent is uncertain.

The dilated, heavily muscular ejaculatory duct appears autapomorphic for *S. exspectatus.* A possible reduction of the ciliation in the atrial ampullae (Remarks above) would also be unique, but this feature needs confirmation on sectioned material.

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